

E-Waste Collection and Its Impact on Street Children in Dhaka: Socio-Legal Analysis and Safety Measures

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Abstract: The role of street children in managing e-waste is often overlooked, even though e-waste is rapidly increasing and poses health and environmental problems on a worldwide scale. This research delves into the negative effects of e-waste collection, the vulnerabilities of street children, and the health concerns connected to it, meanwhile emphasizing the need of safety measures to safeguard the children who are engaged in recycling and accumulating this sort of debris. It investigates the hazards and ongoing damages that street children encounter when they engage in e-waste activities using a combination of qualitative and quantitative approaches, as well as primary and secondary data. The most prevalent psychological, social, and pharmacological issues associated with their predicament are highlighted as well. With a robust literature review, it also explores the environmental impact of e-waste and the vulnerabilities faced by street children where data is collected from diverse stakeholder forms and analysed by employing both qualitative and statistical methods, focusing on a case study and thematic analysis correspondingly. The research discovered that adolescents who are already at a higher risk of developing psychosocial and pharmacological illnesses are much more negatively impacted by prolonged exposure to electronic garbage. Following the study's results, which stressed the necessity of strong legislation, regulations, and good e-waste management practices in reducing the harmful effects of e-waste on susceptible populations, legislative actions are required to avert such complications in children. Finally, the study concluded with policy, community empowerment, and engagement proposals to improve e-waste disposal, prioritize safety, and protect the rights of children living on the streets and diverse stakeholders involved in e-waste management and initiatives to safeguard children may benefit from this study.

1. Introduction

Electronic waste (e-waste) is a growing concern worldwide due to its harmful environmental and human health effects, in recent years, as the exponential mounting of e-waste has emerged as a global apprehension, posing significant risks to human health and ecosystems.¹ The adverse impacts of e-waste due to the deficiency of

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¹ Najifa Farhat, 'Rising e-waste: A Looming Threat' *Dhaka Tribune* (Dhaka, 31 October 2021) <www.dhakatribune.com/bangladesh/2021/10/31/rising-e-waste-a-looming-threat> accessed 26 June 2023.

adequate infrastructure for its disposal are susceptible to recycling in Bangladesh.² Despite the growing concern about the effects of e-waste on public health and the environment, there is limited research on the specific impact of e-waste on street children. Dhaka is the most crowded city, carrying an estimated population of 23.21 million.³ The city generates considerable e-waste, usually disposed of in open corners or informal recycling centres, leading to environmental pollution and health hazards.⁴ Improper disposal and everyday recycling practices have resulted in severe environmental pollution and health risks. Street children, who are struggling for food, shelter, and minimal stands for livelihood, are engaged in e-waste hazardous activities to sustain their livelihoods.⁵ Their involvement in e-waste collection and recycling is a critical concern that demands attention from socio-legal and human rights perspectives. Street children, who are already at risk due to their living conditions and lack of access to basic amenities, education, access to free-of-cost medicine, and doctors' aid, are suffering from the harmful effects of e-waste. One study,⁷ shows that exposure to e-waste can cause various health problems, including respiratory disorders, skin irritation, and neurological damage. The psychosocial impact of e-waste on vulnerable populations like street children has not received adequate attention. Street children are often exposed to e-waste for extended periods, leading to psychological distress⁸ and behavioural problems.⁹ The legal framework in Bangladesh provides some protection for street children. Still, in the broader context, it has yet to be successful in ensuring that inadequate legal safeguards, laws, and regulations related to e-waste management and child protection.¹⁰ Moreover, international legal interventions addressed under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal are ratified without its reflection in practice and are not effectively enforced.¹¹

² Mahadi Hasan Masud and others, 'Towards the effective E-waste management in Bangladesh: A Review' (2018) 26 *Environmental Science and Pollution Research* 1250.

³ World Population Review 'Dhaka Population 2023' <<https://worldpopulationreview.com/world-cities/dhaka-population>> accessed 6 July 2023.

⁴ Masud and others (n 2) 1250.

⁵ Imran Mahmud and others, 'E-Waste Recycling Intention Paradigm of Small and Medium Electronics Store Managers in Bangladesh: An S-O-R Perspective', (2020) 38 *Waste Management and Research*.

⁶ IMSK Ilankoon and others, 'E-Waste in the International Context – A Review of Trade Flows, Regulations, Hazards, Waste Management Strategies and Technologies for Value Recovery' (2018) 82 *Waste Management* 258.

⁷ Hridoy Roy and others, 'Electronic Waste Management Scenario in Bangladesh: Policies, Recommendations, and Case Study at Dhaka and Chittagong for a Sustainable Solution' (2022) 1 *Sustainable Technology and Entrepreneurship* 1.

⁸ Tariq Bin Yousuf and Arif Reza, 'E-Waste management in Bangladesh: Present Trend and Future Implication' (Proceedings of 2011 World Congress of International Solid Waste Association (ISWA), EXCO Daegu, Korea, 17 October 2011).

⁹ Romana Afrose Meem and others, 'A Review on the environmental and health impacts due to electronic waste disposal in Bangladesh' (2021) 08 *GSC Advanced Research and Review* 116.

¹⁰ Olga Nieuwenhuys, 'By the Sweat of Their Brow? "Street Children", NGOs and Children's Rights in Addis Ababa' (2001) 71 *Africa* 539.

¹¹ UNEP, Basel Convention 1989.

This study aimed to identify health risks and hazards associated with e-waste recycling activities for street children in Dhaka city and recommend interventions to reduce their exposure to hazardous materials. The findings will be helpful for policymakers, practitioners, and researchers working in e-waste management and child welfare. Additionally, it contributes to the global efforts to address the growing e-waste problem and protect the health and well-being of vulnerable populations like street children.

Therefore, this research effort aims to analyse the psychosocial and pharmacological impact of e-waste on street children in Dhaka and the legal measures that can be taken to prevent such harm. Like an uprising developing country, Bangladesh is particularly vulnerable to the adverse impacts of e-waste due to the inadequate infrastructure for its disposal, management, and recycling.¹² In Dhaka's capital, e-waste is polluting the environment and affecting the health and safety measures of its vulnerable population, especially street children. The study provided insights into the existing legal framework, its effectiveness in protecting the vulnerable population, and the need for comprehensive legal measures to address e-waste pollution and protect the rights and well-being of street children in Dhaka.

2. An Overview on Socio-Legal Perspectives

Legal Framework for E-waste Management in Dhaka City: Despite these legislative measures, challenges remain in effectively implementing e-waste regulations in Dhaka City. The lack of specific provisions addressing the involvement of street children in e-waste activities poses a significant gap in the legal framework. This gap raises concerns regarding protecting street children's rights, their exposure to hazardous materials, and the prevention of associated psychosocial and pharmacological disorders.

Impact of Street Children's Engagement in E-waste Collection and Recycling: The engagement of street children in e-waste collection and recycling has both positive and negative effects. On the one hand, their involvement contributes to the informal recycling sector, promoting resource recovery and waste reduction. However, the adverse consequences cannot be ignored. Street children often lack the necessary knowledge and protective measures to handle e-waste safely, leading to environmental contamination and health risks.

Environmental Implications of Street Children's Activities: Street children's engagement in e-waste activities poses significant ecological implications. Their informal recycling practices often involve crude dismantling techniques, releasing toxic substances into the environment. The improper disposal of e-waste by street children contributes to soil and water pollution, contaminating local ecosystems. Additionally, burning e-waste to extract valuable metals releases harmful emissions, degrading air quality.

¹² Ilankoon and others (n 6) 258.

Public Health Risks and Psychosocial Consequences: Street children involved in e-waste activities face numerous health risks. Their exposure to hazardous materials such as lead, mercury, and cadmium can lead to acute and chronic health effects, including respiratory problems, developmental disorders, and organ damage. Moreover, the psychosocial consequences cannot be overlooked. The precarious living conditions, exploitation, and social exclusion experienced by street children exacerbate their vulnerability to mental health disorders, substance abuse, and long-term psychological trauma.

The Role of Safety Measures in Mitigating Risks: Safety measures are paramount to protecting street children engaged in e-waste collection and recycling. Safety measures include providing protective equipment such as gloves and masks, ensuring safe working conditions, and implementing proper waste management practices. By incorporating these measures, the risks of exposure to hazardous substances can be minimised, thus safeguarding street children's physical and mental well-being.

3. Literature Review

Psychosocial and Pharmacological Disorders Among Street Children

Street children face psychosocial challenges due to their living conditions and exposure to adverse experiences.¹³ Studies show a high prevalence of mental health disorders, including depression, anxiety, PTSD, and substance abuse. Poverty, violence, and exploitation contribute to these disorders. Children working with electronic waste face toxic exposure, leading to pharmacological diseases and long-term health complications.

A study found that street children in Dhaka who work in e-waste recycling sites are exposed to high levels of lead and cadmium, which can lead to neurological and developmental disorders.¹⁴ The study also found that street children working in e-waste recycling sites are at increased risk of respiratory diseases, skin diseases, and eye infections. Similarly, a study by¹⁵ found that the water and soil samples collected from the e-waste recycling sites in Dhaka contained high levels of lead and cadmium, posing a significant risk to the health of the surrounding population, including street children.¹⁶ According to the study, the soil and rice samples collected from the vicinity of e-waste recycling sites in Dhaka contained high levels of heavy metals, posing a significant risk to the health of the surrounding population, including street children. Another study found that informal e-waste handlers in Dhaka were exposed to high levels of toxic metals, which can have adverse health effects.¹⁷ Another two studies

¹³ UN, 'United Nations Treaty Collection' (2010) 24 Reference Reviews 28.

¹⁴ Mahmudul Alam and others, 'Impacts of Health and Economic Costs on Street Children Working as Waste Collectors in Dhaka City' (2021) 20 International Journal of Environmental and Sustainable Development 29.

¹⁵ Meem and others (n 9) 116.

¹⁶ Yousuf and Reza (n 8).

¹⁷ Roy and others (n 7).

have mentioned the current state of e-waste management in India, including the challenges and potential solutions and the need for effective policies and regulations.¹⁸ A research project provides an overview of the environmental and health impacts of e-waste disposal in developing countries, including the effects on vulnerable populations such as street children.¹⁹ Another investigation reviewed the current state of e-waste management in Bangladesh and proposed recommendations for improvement.²⁰ Another study by 23 indicates that e-waste significantly impacts the health and well-being of street children in Dhaka city. Street children often engage in informal e-waste recycling activities, exposing them to hazardous substances that can have severe health consequences, including respiratory problems, skin disorders, and neurological disorders.

Street Children's Involvement in E-waste Collection and Recycling

Street children in urban areas, including Dhaka City, collect and recycle e-waste due to financial constraints. This exposes them to hazardous materials and unsafe working conditions, potentially leading to long-term health risks. Furthermore, the literature review also revealed that street children in Dhaka who are exposed to e-waste are also at increased risk of social and economic exploitation. A study²¹ found that street children who work in e-waste recycling sites are often subjected to physical and verbal abuse by adult workers, who exploit them for their cheap labour. The study also found that street children working in e-waste recycling sites as low-paid child labour are often deprived of their fundamental rights, including education, healthcare, and a safe and healthy living environment.

The literature review findings highlighted the significant impact of e-waste on street children in Dhaka city. Street children who live and work near e-waste recycling sites are particularly vulnerable to the health risks associated with exposure to toxic chemicals. Furthermore, the exploitation of street children in e-waste recycling sites is a significant social and economic issue that needs to be addressed. Adequate measures need to be taken to regulate the import and disposal of e-waste in Dhaka and to ensure the protection of the health and rights of street children. The study found that legal provisions are in place at national and international levels to regulate e-waste management and protect children's rights. However, implementing these laws and regulations still needs to be improved in Bangladesh, and child labour is prevalent in the informal e-waste recycling sector.

¹⁸ Rajiv Ganguly, 'E-waste management in India: An overview' (2016) 09 International Journal of Earth Sciences and Engineering 574.

¹⁹ Jayapradha Annamalai, 'Occupational health hazards related to informal recycling of E-waste in India: An overview' (2015) 19 IJOEM 61.

²⁰ Rehnuma Haque, 'E-waste management in Bangladesh' *The Financial Express* (Dhaka, 10 February 2022) <<https://thefinancialexpress.com.bd/views/opinions/e-waste-management-in-bangladesh-1644420768>> accessed 22 July 2023.

²¹ Roy and others (n 7).

Street Children and Their Vulnerabilities

Street children are a marginalised and vulnerable group facing numerous challenges. Often lacking proper shelter, access to education, and adequate healthcare, street children are exposed to various hazards and risks. Poverty, family breakdown, and social exclusion contribute to their vulnerable status. These children face difficulties accessing necessities and are often subjected to exploitation, abuse, and violence. The literature study also found that poverty, lack of education, and social marginalisation contribute to the vulnerability of street children to e-waste and its impact. Street children often lack access to healthcare, education, and other essential services, which exacerbates the health and social consequences of their involvement in e-waste recycling.

E-waste and Its Environmental Impact

Electronic waste, or e-waste, refers to discarded electronic devices such as computers, mobile phones, and household appliances. The rapid advancement of technology has led to an exponential increase in e-waste generation worldwide. Improper handling and disposal of e-waste have severe environmental consequences, including soil and water contamination, air pollution, and the release of hazardous substances such as lead, mercury, and cadmium. These pollutants pose significant risks to ecosystems, biodiversity, and human health. Furthermore, effective e-waste management policies and strategies, including safe recycling practices and disposal of hazardous e-waste, are crucial to protecting the health and well-being of street children in Dhaka city. The implementation of laws and regulations related to e-waste management and child labour should be strengthened, and social protection measures should be put in place to address the root causes of child labour and protect children's rights. Moreover, initiatives to provide access to education, healthcare, and other essential services for street children should be developed, along with vocational training programs to offer alternative livelihood opportunities and reduce their dependence on informal e-waste recycling activities. Overall, the findings of this study highlight the urgent need for concerted efforts at the national and international levels to address the impact of e-waste on street children's health and well-being in Dhaka city and OSC beyond.

Safety Measures and Their Importance

Implementing safety measures is crucial to safeguarding the well-being of street children engaged in e-waste collection and recycling. These measures aim to reduce their exposure to hazardous substances, minimise physical risks, and promote safety and health. Safety measures include providing protective equipment, ensuring proper waste management practices, establishing safe working conditions, and offering access to healthcare services. Implementing these measures can mitigate the risks of psychosocial and pharmacological disorders, thus protecting the rights and well-being of street children involved in e-waste activities.

The literature review highlights the urgent need to address the environmental impact of e-waste and the vulnerabilities faced by street children. It underscores the significance of understanding the involvement of street children in e-waste collection and recycling, the associated psychosocial and pharmacological disorders, and the importance of implementing safety measures. The findings from existing studies inform the subsequent analysis and recommendations in this socio-legal analysis, aiming to address the gaps and challenges in Dhaka City's e-waste management practices and protect the rights and well-being of street children.

Problem statement and Research gaps

The analysis shows several gaps in addressing street children's involvement in e-waste activities in Dhaka City. These include inadequate protection of their rights, limited awareness and enforcement of regulations, insufficient provision of education, healthcare and rehabilitation services, inadequate monitoring of safety, and little coordination among stakeholders. A comprehensive approach integrating legal reforms, awareness programs, capacity-building initiatives, and multi-stakeholder collaboration is needed to address these gaps and manage e-waste effectively while protecting street children's rights and the environment. Addressing these challenges and gaps requires a comprehensive approach integrating legal reforms, awareness programs, capacity-building initiatives, and multi-stakeholder collaboration. By bridging these gaps, Dhaka City can effectively manage e-waste while protecting street children's rights, minimising environmental impact, and preventing psychosocial and pharmacological disorders.

4. Methodology and Study design

The study has used a mixed-methods approach and analyzed data on the extent of e-waste contamination in areas where street children live and work, the health risks and hazards associated with e-waste recycling activities, and the factors contributing to their involvement in e-waste recycling activities. Mixed-methods research in socio-legal studies entails integrating qualitative and quantitative research methodologies, whereas this strategy helps scholars better comprehend complicated legal problems by acknowledging sociological paradigms.²² This study conducted semi-structured interviews and group discussions with street children, government officials, NGOs, and technical experts in e-waste management and child rights, as the study area broadly covers the Dhaka city zone. Data was collected through direct observation and analysed using statistical techniques and thematic analysis. Qualitative approaches, including document analysis, interviews, and observations, may shed light on people's experiences, perspectives, and understandings of the law in socio-legal research. In contrast, quantitative approaches like content analysis, statistical analysis, and surveys will reveal numerical data and trends and allow for the generalization of conclusions.

²² Reza Banakar and Max Travers, 'Theory and method in socio-legal research' (Bloomsbury Publishing, 19 December 2005) <<http://ssrn.com/abstract=1511112>> accessed 18 August 2023.

For getting a more comprehensive knowledge of legal phenomena and triangulating their findings by merging qualitative and quantitative methodologies, as when studying complex phenomena impacted by several social, artistic, financial, and political variables, this method shines in the field of socio-legal research.²³ Policy recommendations were provided to enhance e-waste management practices and ensure the well-being of street children. Ethical considerations were secured throughout the study.

5. Analysis of Legal Framework

The legal framework in Bangladesh provides some protection for street children, but implementing laws and regulations related to e-waste management and child protection is inadequate.²⁴ Moreover, international legal interventions, such as the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, provide guidelines for e-waste management but are not always effectively enforced.²⁵

Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal 1989: This convention regulates the transboundary movement of hazardous Wastes, including e-waste. It aims to reduce the generation of hazardous waste and minimise its impact on human health and the environment. The convention imposes obligations on the exporting and importing countries to ensure that the hazardous waste is managed in an environmentally sound manner.²⁶

Stockholm Convention on Persistent Organic Pollutants 2001: This convention regulates the production, use, and disposal of persistent organic pollutants (POPs), including those found in e-waste. This convention aims to reduce the exposure of humans and the environment to POPs and their adverse effects. The convention requires the parties to take measures to reduce and eliminate the production and release of POPs.²⁷

United Nations Convention on the Rights of the Child 1989: This convention protects and promotes children's rights, including the right to a safe and healthy environment. The convention recognises the right of every child to be protected from economic exploitation, hazardous work, and any work that interferes with their education. In addition to the Basel Convention, Stockholm Convention, and the United Nations Convention on the Rights of the Child, other international laws and agreements are

²³ Nigel Fielding, 'Mixed methods research in the real world' (2010) 13 *International Journal of Social Research Methodology* 127.

²⁴ Roy and others (n 7) 1.

²⁵ UNEP, 'The Basel Convention' (2021).

²⁶ Basel Convention, 'General Technical Guidelines for the Environmentally Sound Management of Wastes Consisting of, Containing or Contaminated with Persistent Organic Pollutants (POPs)' 1.

²⁷ Stockholm Convention on Persistent Organic Pollutants 2001.

related to e-waste management and child protection.²⁸ These include **International Labor Organization (ILO) Convention No. 182 on the Worst Forms of Child Labor 1999**: This convention identifies hazardous work that exposes children to dangerous substances as one of the worst forms of child labour. The convention requires states to eliminate such forms of child labour.²⁹

United Nations Guiding Principles on Business and Human Rights 2011: These principles provide a framework for businesses to respect human rights, including children's rights. The regulations require companies to conduct due diligence to identify and mitigate the adverse impacts of their activities on human rights.³⁰

Basel Convention Technical Guidelines on the Environmentally Sound Management of E-waste 2007: These guidelines provide practical guidance on the environmentally sound management of e-waste, including preventing the export of hazardous e-waste to developing countries.³¹

National Perspectives

Bangladesh Environment Conservation Act 1995: This act regulates the import, storage, and disposal of hazardous waste, including e-waste. It provides for establishing an Environmental Court and an Environmental Tribunal to hear environmental pollution and degradation cases. The act imposes penalties for violating its provisions, including imprisonment and fines.³²

Bangladesh Labor Act 2006: This act regulates labour practices, including child labour; it prohibits the employment of children under the age of 14 years in any establishment. The act imposes penalties for violating its provisions, including imprisonment and fines.³³

Bangladesh Children Act 2013 provides protection, care, and rehabilitation for children. It prohibits child labour and imposes penalties for violating its provisions, including imprisonment and fines.³⁴

In addition to the laws mentioned above, Bangladesh has also enacted several legal policies related to e-waste management and child protection.

Bangladesh Environment Policy 1992: This policy provides the framework for managing environmental resources, including preventing and controlling pollution. Policy Recognizes the importance of promoting sustainable development and

²⁸ United Nation, 'United Nations Convention on the Rights of the Child (UNCRC)' (1989) 10 the SAGE Encyclopaedia of Children and Childhood Studies.

²⁹ Worst Forms of Child Labour Convention 1999.

³⁰ UN Guiding Principles on Business and Human Rights 2018, Principle 45.

³¹ Basel Convention (n 26).

³² Bangladesh Environment Conservation Act 1995, s 1-18(I).

³³ Bangladesh Labour Act 2006, s 15.

³⁴ The Children Act 2013.

protecting human health and the environment from hazardous substances, including e-waste.³⁵

Bangladesh Information and Communication Technology (ICT) Policy 2009: This policy aims to promote the development and use of ICT in Bangladesh. The policy recognises the importance of e-waste management and sets guidelines for the disposal of e-waste in an environmentally sound manner.³⁶

National Children Policy 2011: This policy protects, cares for, and develops children in Bangladesh. The policy recognises the need to protect children, including child labour, from exploitation, abuse, and neglect.³⁷

6. Findings & Discussions

Despite these legal provisions, implementing laws and regulations related to e-waste and child labour in Bangladesh still needs to be improved. Therefore, more concerted efforts are required to enforce these laws and regulations to protect the health and safety of street children involved in e-waste recycling activities in Dhaka City. Overall, these laws and policies provide a framework for managing e-waste and protecting children's rights in Bangladesh and globally. However, implementing these laws and policies remains challenging, particularly in developing countries like Bangladesh, where weak enforcement mechanisms and a lack of resources hinder effective implementation. Various policies and frameworks are in place to protect street children from e-waste hazards in different countries. For instance, in the United States, the Environmental Protection Agency (EPA) has implemented the National Strategy for Electronics Stewardship to promote the safe and sustainable management of used electronics. Additionally, the Occupational Safety and Health Administration (OSHA)³⁸ has regulations that protect workers, including street children, who may come into contact with hazardous electronic waste. Bangladesh has established legal provisions to protect children from the hazards of e-waste, and implementing and enforcing these policies remains a significant challenge. Addressing these challenges required the cooperation of all stakeholders, including the government, the private sector, and local communities, to develop effective e-waste management systems that protect health. Under the Bangladesh E-waste Management Policy, 2018, the government has outlined several critical strategies for managing e-waste and safeguarding public health and the environment.³⁹ These include:

³⁵ Environmental Policy 1992.

³⁶ Government of the People's Republic of Bangladesh, Information and Technology Policy 2018.

³⁷ Bangladesh National Children Policy 2011.

³⁸ 'OSHA- Occupational Safety and Health Administration' <<https://www.osha.gov/>> accessed 4 July 2023.

³⁹ CERM, 'Assessment of Generation of E-Waste, Its Impacts on Environment and Resource Recovery Potential in Bangladesh' <https://doe.portal.gov.bd/sites/default/files/files/doe.portal.gov.bd/page/1f58f60a_51d9_46c0_9fa1_79b7b565db05/2020-10-01-13-02-e522e1499ac288d119a6f7ae16c7f7d0.pdf> accessed 10 July 2023.

- Establishing an institutional framework for e-waste management: The policy requires the creation of a national e-waste management authority and the development of e-waste management systems at the local level.
- Encouraging environmentally sound practices: The policy promotes adopting ecologically sound practices in managing e-waste, including using clean technologies and reducing hazardous substances.
- Promoting public awareness: The policy calls for public awareness about e-waste hazards and the importance of proper e-waste management.
- Regulating the import and export of e-waste: The policy seeks to regulate the import and export of e-waste to prevent the dumping of hazardous waste in Bangladesh.
- Establishing e-waste collection and recycling centres: The policy requires the establishment of e-waste collection and recycling centres to facilitate the proper disposal of e-waste.

Despite legal provisions for e-waste management in Bangladesh, the implementation of these policies has been limited, and street children in Bangladesh continue to be exposed to e-waste hazards.⁴⁰

To protect children from e-waste hazards, policies must be enforced and waste management infrastructure developed. E-waste includes discarded devices that contain hazardous materials. Improper disposal leads to environmental and health consequences, particularly for vulnerable groups like street children. Initiatives like PACE, UNDP's E-waste Management Project, ILO's Time-bound Programme, and Alliance for Child Protection highlight the importance of addressing e-waste's impact on children's health and provide a framework for effective interventions. However, e-waste management in Bangladesh faces challenges like environmental pollution and public health hazards.

One of the main challenges is the lack of proper e-waste management infrastructure in Bangladesh, resulting in informal and unsafe disposal methods such as open burning, dumping, and recycling by untrained individuals.⁴¹ This can lead to the release of hazardous chemicals and heavy metals into the air, water, and soil, causing environmental pollution and posing health risks to workers and communities.⁴² Another challenge is the public's limited awareness and education on e-waste management, including street children often exposed to e-waste as scavengers or waste

⁴⁰ Shahriar Hossain, 'Study on E-waste: Bangladesh Situation' Environment and Social Development Organization (ESDO) 2010.

⁴¹ Kaviul Islam and others, 'Waste to Energy: An Experimental Study of Utilizing the Agricultural Residue, MSW, and E-Waste Available in Bangladesh for Pyrolysis Conversion' (2021) 7 Heliyon 1.

⁴² Rahul Rautela and others, 'E-waste management and its effects on the Environment and Human Health (2021) 773 Science of The Total Environment 145623.

pickers.⁴³ This lack of knowledge can lead to unsafe handling and disposal practices, increasing the risk of exposure to toxic substances and adverse health effects.⁴⁴

Furthermore, the informal e-waste recycling and processing sector often operates without proper regulations, resulting in poor working conditions, low wages, and child labour.⁴⁵ This can lead to psychosocial and pharmacological disorders among street children, particularly vulnerable to exploitation and abuse.⁴⁶ Addressing these challenges requires a comprehensive and coordinated approach involving government, industry, civil society, and the public, focusing on building sustainable e-waste management systems and promoting safe and responsible practices.⁴⁷

In India, e-waste (Management and Handling) Rules have been implemented to regulate the handling, generation, and disposal of electronic waste.⁴⁸ The rules require manufacturers to take back and recycle their products, and they also prohibit the import of specific hazardous electronic waste.

In Bangladesh, there are legal provisions in place to protect children from e-waste hazards. The country has established the Bangladesh Environment Conservation Act of 1995, which provides guidelines for managing hazardous and electronic waste.⁴⁹ The Department of Environment has also established the Bangladesh E-waste Management Policy, 2018, which outlines various stakeholders' responsibilities in e-waste management.⁵⁰ However, implementation of these policies has been limited, and street children in Bangladesh are still exposed to e-waste hazards.

E-waste management practices vary across countries. In Dhaka City, the informal recycling sector dominates, posing health and environmental risks to street children who collect e-waste. Formal e-waste management practices are needed to prioritise sustainability, health, and social equity. International agreements like the Basel Convention aim to minimise hazardous waste. Implementing and enforcing e-waste policies is crucial for safe and sustainable management.

In addition to these country-specific policies and frameworks, there are also international agreements and initiatives to address the hazards associated with e-waste. For example, the Basel Convention on the Control of Transboundary

⁴³ Roy and others (n 7) 1.

⁴⁴ Tushar Savarkar, Shankar Das, 'Mental Health Problems among Street Children: the Case of India' (2019) 02 CRJSSH 39.

⁴⁵ *ibid* 41.

⁴⁶ *Ibid* 45.

⁴⁷ Muskan Jain and others, 'Review on E-waste management and its impact on the environment and society' (2023)1 Waste Management Bulletin 34.

⁴⁸ Ministry of Environment, Forest and Climate Change, 'E-waste (Management and Handling) Rules' (2016) <<http://moef.gov.in/wp-content/uploads/2016/03/e-waste.pdf>> accessed 27 June 2023.

⁴⁹ Department of Environment (DOE).

⁵⁰ CERM (n 39).

Movements of Hazardous Wastes and their Disposal aims to minimise the generation of hazardous waste and to ensure its environmentally sound management.⁵¹

Dhaka City's E-waste Management

Overview of Dhaka City's E-waste Management Practices

Dhaka City, the capital of Bangladesh, struggles to manage its e-waste due to rapid technology growth and increasing consumer demand. The existing e-waste management infrastructure is primarily informal, posing environmental and health risks.

Involvement of Street Children in E-waste Collection and Recycling

Raising awareness about e-waste and its hazards, especially for street children. Education, awareness campaigns, and community involvement can promote sustainable e-waste management practices. Community participation in monitoring and reporting unsafe practices can contribute to enforcing safety measures and protecting street children's rights. By involving stakeholders and engaging the community, Dhaka City can develop comprehensive strategies for sustainable e-waste management, involving stakeholders and engaging the community while protecting street children's rights.

Existing Safety Measures and Their Effectiveness

In Dhaka City, the implementation of safety measures for street children involved in e-waste activities is limited. The informal nature of the recycling sector poses challenges to enforcing safety regulations. Nonetheless, several initiatives have been undertaken to tackle the issue. Given the dangers these children face, the need for an effective and sustainable solution to this problem is paramount. Efforts to promote and enforce safety measures in this sector must be intensified to protect the well-being of these vulnerable children.

Stakeholder Perspectives and Community Engagement

Effective e-waste management in Dhaka City requires collaboration between government agencies, NGOs, waste management agencies, and community representatives. Community engagement and awareness campaigns can empower people to monitor and report unsafe practices and promote sustainable e-waste management practices. By incorporating stakeholder perspectives and community engagement, Dhaka City can develop comprehensive strategies to protect street children's rights, enhance safety measures, and promote sustainable e-waste management practices.

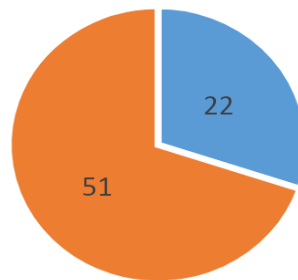
⁵¹ Basel Convention (n 26).

7. Field Study Findings and Discussions

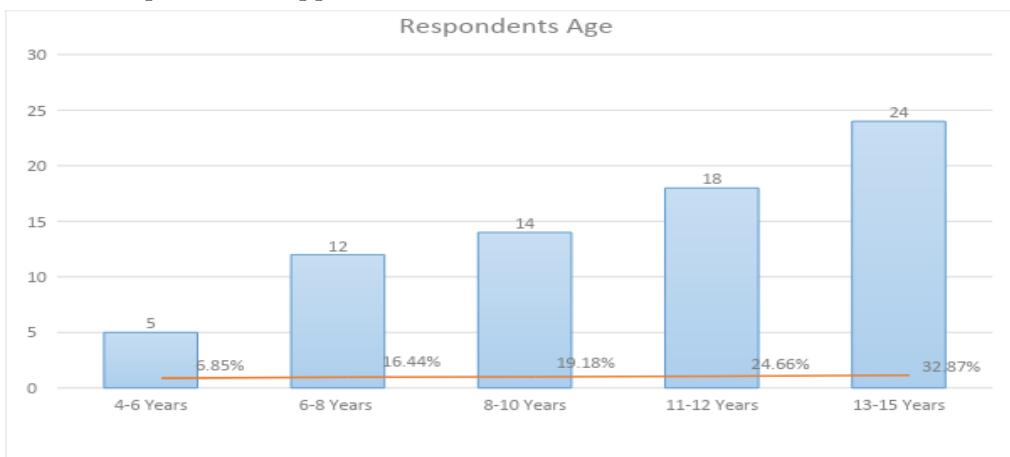
The data presented in this research overview pertains to a study conducted on waste collectors or ‘Tokay’ in a developing country. The quantitative research aims to provide insights into street children’s demographic characteristics, educational background, involvement in waste collection, and socioeconomic status to inform policies and interventions to improve their living conditions. The data is derived from a close observation and collected data survey of 73 respondents, including male and female street children popularly known as Tokay.

Demographic Characteristics: The study found that most respondents were boys (69.86%), while the remaining were females (30.14%). The age range of the respondents varied from 4 to 15 years, with the highest number of respondents (32.87%) falling under the age bracket of 13 to 15 years. The study also found that most respondents were involved in waste collection for 2-4 years (34.25%) and had been attending NGO or government-owned primary schools (30.14%).

Total Number of Population and Gender



For details, please see (Appendices)



Socioeconomic Status:

Regarding the respondents’ monthly income, most (31.51%) earned between 6000-8000 Taka, while the remaining respondents’ income ranged from 2000 to above 8000 Taka.

The study also found that most of the respondents (43.84%) lived in slums, followed by mixed areas (26.02%), streets (23.28%), and village homes (6.85%).

Involvement in Waste Collection: The study found that male and female Tokay collected wasted food from garbage and other waste vehicles, with males (34.25%) contributing more than females (24.66%). Additionally, 41.09% of the respondents were not involved in waste collection. The study also found the highest number of respondents engaged in waste collection for 2-4 years (34.25%). This data is a survey or study conducted on street children involved in waste collection in an unidentified location. The survey includes information on the gender and age distribution of the respondents, their educational background, involvement in waste collection, monthly income, and the awareness of health risks associated with e-waste among them. According to the data, out of 73 respondents, 69.86% were boys, and 30.14% were females. The age distribution of the respondents ranged from 4 to 15 years, with the majority falling into the 13-15 age group (32.87%).

Regarding education, 30.14% had attended government primary school, while 12.33% had no schooling and remained illiterate. Regarding waste collection, the data shows that most respondents (68.72%) had been involved in waste collection for more than two years. About 34.25% of the respondents were males who collected wasted food from garbage and other waste vehicles, while 41.09% were not involved in waste collection. The survey explored the awareness and perceptions of health risks associated with e-waste among street children. The results show that 84% of the respondents agreed that street children were aware of the safety of their health and knew that e-waste risks their safety. However, only 54% of the respondents agreed that street children knew the steps to save their health, which is at risk.

Family Structure and Crime Records: Regarding family structure, most of the respondents (27.39%) had three members involved in earnings, followed by four members (23.28%) and two members (17.81%). Moreover, the study found that 54.79% of the respondents had no criminal records, and only 13.69% were arrested at least two times by the police. This gender difference may be attributed to cultural and societal norms restricting female Tokay's mobility and involvement in waste collection activities. Moreover, the study found that a small percentage of the respondents had criminal records, which may negatively affect their future employment prospects.

Contribution to Family Income: Regarding the income range and contribution to the family income, the study found that most respondents (27.39%) earned between 300-500 Taka per day and contributed to their family income. However, a small percentage (5.48%) earned income but did not contribute to their family's income, while 4.11% occasionally or irregularly contributed.

As mentioned earlier, legal cases related to e-waste impact on street children in Bangladesh and internationally are limited in number, and publicly available information on them is scarce. However, some notable initiatives and programs have

addressed the impact of e-waste on street children, providing essential insights into the legal and policy landscape on this issue.

One such initiative is the International Labour Organization's (ILO) Time-bound Programme on Eliminating Child Labour in Hazardous Working Conditions in Bangladesh's Informal Recycling Sector. This program addresses child labour and other hazards associated with informal e-waste recycling activities in Bangladesh. As part of this initiative, the ILO has been working with government agencies, NGOs, and other stakeholders to improve working conditions, reduce exposure to hazardous substances, and provide alternative livelihoods for children engaged in informal e-waste recycling activities.

Another critical case is the lawsuit filed by the Basel Action Network (BAN) against a US-based electronics recycling company for exporting hazardous e-waste to developing countries, including Bangladesh. BAN alleged that the company was engaging in illegal e-waste exports, which posed a significant risk to public health and the environment in the receiving countries, including children involved in informal e-waste recycling activities. The case was settled out of court, with the company agreeing to pay a fine and implement measures to improve its e-waste management practices.

8. Prevention Strategies

Education and Awareness Programs

Education programs can prevent disorders among street children engaged in e-waste activities in Dhaka City. These programs increase understanding of health risks and safety measures. Children can protect themselves by providing information on the consequences of e-waste collection. Programs should meet their specific needs using culturally sensitive approaches. Collaboration with organisations can enhance the impact of initiatives.

Access to Healthcare and Counselling Services

Healthcare and counselling services are crucial for addressing disorders among street children. Establishing facilities targeted at this population can provide medical care and mental health support. Collaboration between healthcare providers, mental health professionals, and social workers can ensure accessibility of services to street children.

Rehabilitation and Reintegration Initiatives

Access to healthcare and counselling is crucial for preventing and addressing disorders among street children. Establishing targeted healthcare facilities can provide regular check-ups, vaccinations, and treatment for acute and chronic health conditions. Mental health support and counselling, such as group therapy and trauma-informed care, can help street children cope with their challenges. Collaboration between healthcare providers, mental health professionals, and social workers can ensure the availability of these services for street children engaged in e-waste activities.

8.1 Collaborative Efforts between Government and Non-Governmental Organisations

Providing healthcare and counselling services is crucial for addressing disorders among street children. Dedicated healthcare facilities can provide medical care and treatment for acute and chronic health conditions. Mental health support and counselling services are also essential, and psychosocial interventions can help them cope with emotional and psychological challenges. Collaborating between healthcare providers, mental health programs, and collection drives, and ensure the availability and accessibility of these services to street children involved in e-waste activities. Dhaka City can promote its safety and long-term development by prioritising the well-being and rights of street children.

9. Policy Recommendations

Strengthening Legislative Frameworks for E-waste Management

To tackle e-waste challenges faced by street children in Dhaka City, it's essential to strengthen legislative frameworks for e-waste management. This requires amending existing laws or developing new legislation to reflect evolving practices and address the unique needs of street children. Collaboration with relevant stakeholders is essential in drafting comprehensive legislation, and regular monitoring and enforcement mechanisms should be established to ensure compliance and accountability.

Enhancing Safety Measures and Monitoring Mechanisms

Promote responsible e-waste disposal through awareness campaigns and convenient drop-off points. Provide accessible education and skill development programs to empower street children and provide alternative opportunities. Regular monitoring and inspections of e-waste collection and recycling sites should be conducted to ensure compliance with safety standards.

Integrating Street Children's Rights and Well-being in Policies

E-waste management policies must consider street children's rights and well-being, including access to education, healthcare, social services, and protection from exploitation. Governments should develop comprehensive policies safeguarding street children's rights in e-waste activities, collaborating with agencies, child protection organisations, and community-based groups. Street children should actively participate in policymaking to ensure their perspectives and needs are considered.

Promoting Sustainable Practices in E-waste Recycling

Establishing proper e-waste recycling facilities with safe and environmentally friendly technologies and complying with international standards and best practices is crucial for promoting sustainable practices and minimising environmental pollution and health risks in Dhaka City. Public awareness campaigns and collection drives, along

with convenient drop-off points for electronic devices should be encouraged to facilitate responsible e-waste disposal among individuals, businesses, and institutions.

Empowering Street Children through Education and Skill Development

Supporting and expanding existing initiatives and programs to address the impact of e-waste on street children is crucial. Two such initiatives are the International Labour Organization's Time-bound Programme on Eliminating Child Labour in Hazardous Working Conditions in Bangladesh's Informal Recycling Sector and the Basel Convention's Partnership for Action on Computing Equipment (PACE) initiative. To effectively manage e-waste and child labour, it is essential to strengthen the implementation of existing national and international laws. This can be achieved by fostering greater collaboration and coordination between government agencies, NGOs, and other stakeholders and increasing public awareness and education.

Comprehensive interventions and solutions should be developed to protect street children from the health hazards of informal e-waste recycling activities. This includes providing access to health services, education, alternative livelihoods, and ensuring safe and sustainable e-waste management practices. Initiatives such as the International Labour Organization's Time-bound Programme on Eliminating Child Labour in Hazardous Working Conditions in Bangladesh's Informal Recycling Sector and the Basel Convention's Partnership for Action on Computing Equipment (PACE) initiative provide a framework for effective interventions and solutions to address this issue.

10. Conclusion

In conclusion, the research on the impact of e-waste on street children in Dhaka City has underscored the urgent need for a comprehensive approach that integrates policy reforms, safety measures, community engagement, and empowerment of street children. The study has highlighted the significant adverse effects of exposure to electronic waste on vulnerable children's physical, psychological, and social well-being, leading to psychosocial and pharmacological disorders. The study also identified the need for legal measures to prevent such disorders among children. The findings highlighted the importance of proper e-waste management practices, effective policies, and regulations to reduce the negative impact of e-waste on vulnerable populations. The government and other relevant authorities must enforce rules that ensure the safe disposal of electronic waste and minimize its impact on street children. Moreover, awareness-raising campaigns are essential to educate people about the dangers of e-waste and promote responsible e-waste disposal practices. This research serves as a wake-up call for all stakeholders to act toward preventing the negative impact of e-waste on the health and well-being of children and the wider community. Finally, providing access to primary education, health care, and vocational training can help reduce the number of street children scavenging e-waste and improve their overall well-being.

Appendix**Relevant Demography and Role to the Family Economy of the Respondents**

SL No	General Data of the said Respondents	Total Response	Average Percentage
1	Total Population & Gender		
1.1	Females and Girls (Inconsideration of child marriage issues)	22	(30.14%)
1.2	Boys	51	(69.86%)
	Total (N)	73	(100%)
2	Respondent age		
2.1	4-6 Years	05	(6.85%)
2.2	6-8 Years	12	(16.44%)
2.3	8-10 Years	14	(19.18%)
2.4	11-12 Years	18	(24.66%)
2.5	13-15 Years	24	(32.87%)
3	Primary Education and Other levels		
3.1	Government Primary School	22	(30.14%)
3.2	NGO/ Private owned Primary School	12	(16.44%)
3.3	NGO arranged street schooling	17	(23.28%)
3.4	Other Forms of Voluntary Schooling & Night Schooling	13	(17.81%)
3.5	No schooling / remaining illiterate	9	(12.33%)
4	How long time have they been involved in waste collection as a Tokay?		
4.1	0-2 Years	21	(28.77%)
4.2	2-4 Years	25	(34.25%)
4.3	4-6Years	15	(20.55%)
4.4	6-8 Years	10	(13.69%)
4.5	8 years above	2	(02.74%)
5	Age Criteria of Involvement in waste collection		
5.1	4-6	09	(12.32%)
5.2	6-8	14	(19.18%)
5.3	8-10	19	(26.02%)
5.4	10-12	20	(27.39%)
5.5	12-14	11	(15.06%)
	Total	73	
6	Wasted food collection from garbage and other waste vehicles		
6.1	Females	18	(24.66%)
6.2	Males	25	(34.25%)
6.3	Not involved in waste collection	30	(41.09%)
7	Residing Places		
7.1	Streets	17	(23.28%)
7.2	Slums	32	(43.84%)
7.3	Village Home	05	(06.85%)
7.4	Mixed	19	(26.02%)

8	Monthly Income Ranges		
8.1	2000-4000 Taka	18	(24.66%)
8.2	4000-6000 Taka	20	(27.39%)
8.3	6000-8000 Taka	23	(31.51%)
	Above 8000 Taka	12	(16.44%)
9	Custodian and number of members involved in earnings		
9.1	No Families	6	(08.22%)
9.2	No Other members	14	(19.18%)
9.3	2 Members	13	(17.81%)
9.4	3 Members	20	(27.39%)
9.5	4 Members	17	(23.28%)
9.6	Above	3	(04.11 %)

10 Street Children's Awareness and Perceptions of the Health Risks

Health risk assessment	Range of Observation					Average Scale Value	Agreed Observ.
	1	2	3	4	5		
Street children are aware enough of the safety of their health. They know that e-waste risks their safety	0%	05%	11%	25%	59%	4.44	84%
E-waste causes chronic disease, and they are aware enough of that.	0%	0%	15%	38%	47%	4.44	85%
Street Children know the steps to save their health, which is at risk.	32%	22%	18%	10%	06%	2.36	54%
E-waste causes several health risks, and street children face high fever, vomiting, dizziness, intolerance, rude behaviour, and hopelessness.	0%	0%	15%	38%	47%	4.44	85%
E-waste causes severe skin (Dermatological problems). They are very indifferent towards maintaining safety measures	0%	10%	10%	35%	49%	4.44	10%
E-waste causes severe respiratory problems. Street children are very indifferent toward maintaining safety measures	0%	7%	11%	30%	50%	4.44	07%
E-waste causes gastronomical problems. Street children are indifferent toward maintaining safety measures.	0%	5%	11%	35%	46%	4.44	05%
E-waste causes eyesight, vision, and dental problems. Street children are indifferent toward maintaining safety measures	0%	04%	10%	32%	50%	4.44	05%

	10.1	Crime Records: Arrested at least twice by the Police?	10	(13.69%)
	10.2	A criminal Case was Filed and Pending	02	(02.74%)
	10.3	Settled by the locals and police station	18	(24.66%)
	10.4	No Disclosed	03	(04.11%)
	10.5	No Crime Records	40	(54.79%)
11		Per day income and contribution range to the families		
	11.1	10-100	9	(12.33%)
	11.2	100-300	16	(21.92%)
	11.3	300-500	20	(27.39%)
	11.4	500-1000	11	(15.07%)
	11.5	Above	10	(13.69%)
	11.6	Incomed but No Contribution to Families	04	(05.48%)
	11.7	Occasional/ irregular Contributions	03	(0411%)

